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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/676,679

10/01/2003

H. Yang Pang

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EXAMINER

DETSCHER, MARISSA

ART UNIT

PAPER NUMBER

2877

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/676,679

Applicant(s)

PANG ET AL.

Examiner

Marissa J. Detschel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 15-17 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 01/05/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed on October 1, 2003 has been fully considered by the examiner.

Drawings

The drawings are objected to because of a mistype in the heading of Figures 6A and 6B. The word "arring" in the heading should be written as "arriving." Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 14 is objected to because of the following informalities: Claim 14 recites the limitations "said pulse-repetition frequency" and "said laser resonator." Claim 14 is dependent on the method of claim 12, step (c). Step (c) of claim 12 does not disclose a pulse-repetition frequency or a laser resonator. Examiner suggests replacing "step (c)" with "step (a)" of claim 12, which does disclose a pulse-repetition frequency and a laser resonator. The claim was examined as such in this action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 4, 5, and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 4 discloses varying said resonator length incrementally and claim 5 discloses varying said resonator length continuously. While the specification does disclose methods to vary the resonator length, it fails to disclose these specific varying techniques.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-3 and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holsinger et al. (USPN 5,367,529) in view of Kane et al. (USPN 5,754,292) and Ball et al. (USPN 4,896,324).

Regarding claims 1 and 8, Holsinger et al. discloses the use of two repetitively-pulsed laser resonators (10 and 12) with pulse trains sent at first and second pulse repetition frequencies (column 2, lines 34-39) that are directed to overlap on a detector (62), said detector providing a response dependent on the magnitude of the overlap of the pulses (column 5, lines 4-30), and a device (74) for varying the optical length of the first resonator (column 5, lines 24-25). Holsinger et al. does not disclose recording the magnitude of response of the detector at different degrees of overlap. Holsinger et al. does not disclose varying the optical length until first and second repetition frequencies are equal.

Regarding recording the magnitude of the response of the detector at different degrees of overlap, Kane et al. discloses the use of a spectrometer and a camera (34) to record the spectrum from the spectrometer to produce an intensity plot vs. frequency and delay of a selected temporal slice of a laser pulse (column 5, lines 16-18). Different degrees of temporal overlap of pulses in Kane et al.'s device results from a variable change in delay, which can be controlled by moving an alignment system (18) vertically to increase the optical path length of the laser pulse (column 4, lines 58-59).

Furthermore, in regards to claim 2 and 9, the magnitude of the response at each degree of temporal overlap is recorded using the spectrometer and camera (Figures 3B, 3D, and 3F and column 5, lines 25-28). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the recording device of Kane et al. in Holsinger et al.'s device to produce said intensity plots for scientific studies of the time correlation of laser pulses.

Regarding varying the optical path length until first and second repetition frequencies are equal and claim 7, Ball et al. discloses an apparatus for actively controlling the cavity lengths of coupled laser resonators by positioning mirrors in order to ensure that they are locked at the same frequencies (column 2, lines 6-11). If there is a difference in frequencies between the two lasers, the interference pattern will be altered (column 1, lines 18-20). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the frequency locking technique of Ball et al.'s apparatus in Holsinger et al.'s apparatus to ensure that the

interference patterns indicative of the overlap of the coupled laser pulses of the resonators are accurate, and do not contain any alterations.

In regards to claims 3 and 10, the degrees of temporal overlap are recorded as one of phase and time in Kane et al.'s by having the output results of the camera in the form of intensity plot vs. frequency and delay. The delay represents time, and the output record determines the phase characteristics of the pulse. (column 5, lines 25-31) It would have been obvious to one of ordinary skill in the art at the time of the invention to use the output results of Kane et al.'s apparatus to produce said intensity plots to gain scientific insight into how time correlation of laser pulses is affected by delay (time) and phase of the pulse.

In regards to claim 11, Holsinger et al. discloses varying the first laser resonator length until first and second pulse trains have a predetermined phase relationship with each other (column 5, lines 24-30).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holsinger et al. (USPN 5,367,529) in view of Kane et al. (USPN 5,754,292) as applied to claim 1 above, and further in view of Ogawa (USPN 6,819,428 B2).

In regards to claim 6, Holsinger does not disclose the use of a two-photon detector. Ogawa discloses the use of a two-photon absorption medium as a detector where two laser pulses overlap. The two-photon detector allows for a decrease in transmission intensity of the one of the pulses when the two pulses cross. (column 6, lines 15-19) It would have been obvious to one of ordinary skill in the art at the time of the invention to use the two-photon detector of Ogawa to decrease transmission

intensity to make the signal outputting from the detector as a result of the overlap of the lasers to be more clear.

Claims 12-14, and 16 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Kane et al. (USPN 5,754,292) in view of Ball et al. (USPN 4,896,324).

In regards to claim 12, 13, and 14, Kane et al. discloses the use of a beamsplitter (14) to divide a pulse train from a laser resonator into first and second components (probe and gate pulse), directing the components (13 and 15) along first ($E(t)$) and second ($E(t-\tau)$) paths to a detector (24), with the second path being longer than first by varying the delay alignment system (18) with vertical downward movement as indicated by the arrow in Figure 1, and said detector (24) providing output in response to the degree of temporal overlap of the two components (column 5, lines 13-19). Kane et al. discloses varying the pulse repetition frequency to change the temporal overlap between the components, said overlap being indicated by the camera records of intensity from the spectrometer readings in figures 3B and 3F. These camera records correspond to the magnitude of the response of the detector, and are shown in figures 3B and 3F at different degrees of overlap. (column 5, lines 16-18 and 20-24 and figures 3A, 3B, 3E, and 3F) Kane et al. does not disclose the use of a repetitively pulsed resonator having a pulse repetition frequency that is selectively variable.

In regards to the pulse repetition frequency of the detector being selectively variable, Ball et al. discloses a method for changing the cavity length of a laser resonator using a displaceable mirror in order to match the resonator frequency with a

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selected electromagnetic frequency (column 1, lines 47-61). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the mechanism of Ball et al.'s apparatus to change the cavity length of Kane et al.'s device in order to get a detector response at varying frequencies to gain knowledge on how varying frequencies can affect the temporal overlap of the pulses.

In regards to claim 16, Kane et al.'s device allows the second pulse component of the Nth pulse ($E(t)$) to temporarily overlap the first component of the (N+1)th ($E(t-\tau)$) pulse (Figure 2).

Allowable Subject Matter

Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

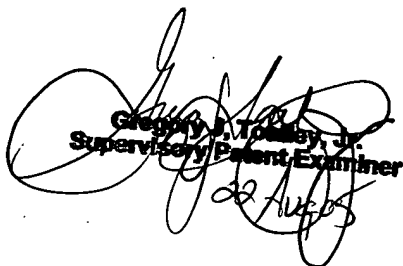
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marissa J. Detschel whose telephone number is 571-272-2716. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on 571-272-2059. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJD


Gregory A. Tolson, Jr.
Supervisory Patent Examiner
22 JUL 05